Project Fact Sheet			
Project Title	Addressing the Technological and Socio-Economic Factors Hindering the Use of Solar PV-Based Mini-Grids in Sub- Saharan Africa with Focus on Lesotho and Mozambique		
Keywords	Off-Grid electricity, solar energy, collaborative research workshops, Sub-Sahara Africa		
Project Details			
Project Start	2022	Duration	1 Year
Grant Scheme	Initiation of Collaborative Projects with Researchers from Sub-Saharan Africa in the Field of Solar Energy		
Funding Authority	DFG – German Research Foundation		
Project Budget	50.000 €		
Project Leader	Prof. DrIng. Wilfried Zörner		
Contact Person	Stefan Schneider		
Project Partners Partner Universities: University Eduardo Mondlane (Mozambique) National University Lesotho (Lesotho) University of Bayreuth (Germany)			

## **Description**

The partner countries Mozambique and Lesotho face similar challenges when it comes to the provision of clean and secure electricity, with electrification rates ranging from only 31% to 47% in 2020.<sup>1</sup> These challenges could be tackled by exploiting the huge solar energy potential both countries are endowed in. Solar PV-based Mini-Grids can play a pivotal role, particularly in rural, off-grid areas suffering from scarce and often unreliable access to electricity. The project therefore addresses the technological and socio-economic factors hindering the use of solar PV-based Mini-Grids in Lesotho and Mozambique.

In both countries, there have been initiatives to install Mini-Grid systems in order to attempt a change of trajectory in energy production and supply in rural areas. These initiatives were mainly

<sup>&</sup>lt;sup>1</sup> The World Bank (2018): Access to electricity (% of population). Available online:

https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS [last access: 06.05.2022]. Technische Hochschule Ingolstadt, Institute of new Energy Systems – Esplanade 10 – D-85049 Ingolstadt – Phone +49 (0)841 / 9348 3720 – www.thi.de/go/energy

driven by public entities, although the governments of Lesotho and Mozambique would like to encourage private sector involvement. However, a widespread use of solar PV-based Mini-Grids, including the private sector, requires robust and dynamic institutional frameworks<sup>2</sup>. So far, the policy specific targets and suitable strategies that operationalise the energy policy have not yet been sufficiently developed neither in Mozambique nor in Lesotho.

Regarding the technological aspects of solar PV-based mini-grids, typically questions such as resource availability, technical suitability under extreme conditions (temperature shocks, dust and sand, high humidity), interaction of electricity production and storage, modern battery technologies (lithium-ion versus lead-acid), user feedback and load management arise. To create tailor-made solar PV-based Mini-Grids, it is thus necessary to have fundamental insights into the technological barriers and challenges for the specific local contexts and their environmental and societal conditions. Research needs to be conducted in collaboration of academic experts from different locations and disciplines combining technological, financial, economic and ecological considerations as well as socio-spatial aspects of electricity practice and supply.

Hence the main aim of the subsequent research collaboration is to address technological, economic and socio-spatial factors currently hindering the widespread use of solar PV-based Mini-Grids. Furthermore, the project strives to create sustainable impact by supporting national and regional development goals related to the use of solar energy resources and by improving livelihoods of rural communities in Sub-Saharan African countries.

The three lead partners are represented by researchers of the Energy Research Centre (ERC) at the National University of Lesotho (NUL), Eduardo Mondlane University (UEM), Maputo/Mozambique and the Institute of new Energy System (InES) at Technische Hochschule Ingolstadt (THI) in Germany. All three partners are well-reputed and have wide ranging activities in RE research. Together, the three institution have the capability to act as hubs that contribute to a change process that can expand further into a larger part of the university systems. As a supporting partner, the University of Bayreuth (UBT) will contribute their expertise in socio-geographic analyses of energy demand, usage and production patterns. The outcome of the initiated collaboration through the DFG support is expected to be a long-term trilateral partnership between the universities and RE research centres in Lesotho, Mozambique and Germany as well as joint research approaches as a basis for subsequent projects.

Within the project, several exploratory workshops will be carried out in the different partner countries, with participants from a variety of disciplines. This interdisciplinary approach reflects the need to analyse the challenges of wide-spread Mini-Grid use from a holistic perspective. The purpose of these workshops is to exchange on these diverse challenges and jointly develop a subsequent project proposal that is meant to help overcome them. With participants from Germany, Lesotho and Mozambique, these workshops benefit from the sharing of different experience and best practice, thus contributing to knowledge transfer and ensuring a sustainable and innovative approach to future joint projects.

<sup>&</sup>lt;sup>2</sup> Bhattacharyya, S. C.; Palit, D. (2016): *Mini-grid based off-grid electrification to enhance electricity access in developing countries: What policies may be required?*. In: Energy Policy (94), p.166–178. doi: 10.1016/j.enpol.2016.04.010.

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